

CLAIMS

What is claimed is:

- 5 1. A motor operator, for an electrical power switch, comprising:
a motor having a motor shaft;
an output member attachable to a switch operating mechanism;
a mechanical drive assembly coupled between the motor shaft and the
output member, the drive assembly including at least a first drive element continuously
10 mechanically linked to, and subject to movement with, the motor shaft and at least a
second drive element continuously mechanically linked with the output member;
the first and second drive elements being arranged to have temporarily
mutually engaging parts, with transfer of motive force to the output member sufficient for
switch operation, during operation of the motor;
15 the first and second drive elements and their temporarily mutual engaging
parts also being arranged to self-disengage from each other following motor movement of
the output member.
2. The motor operator of claim 1 further comprising:
an operating member continuously mechanically linked with the output
20 member, the operating member being arranged to receive motive force from a source
independent of the motor to drive the output member without requiring movement of the
motor shaft or the first drive element.
3. The motor operator of claim 2 where:
the operating member at least in part includes a handle secured with a
25 shaft fixed with the output member with one or more features for temporary location of a
hand tool for manual operation of the output member while the first and second drive
elements are disengaged.
4. The motor operator of claim, 1 where:
the first and second drive elements include as the temporarily mutually
30 engaging parts at least first and second engagement parts that are joined to respective

ones of the first and second drive elements and at least one of the first and second engagement parts includes an energy storage member;

the first and second drive elements have temporary mutual engagement with transfer of motive force that is released following motor operation to effect positive
5 disengagement of the first and second drive elements.

5. The motor operator of claim 4 where:

the first drive element includes a first drive plate rotatable on a bearing about a first shaft portion and mechanically linked to rotate in direct relation to rotation of the motor shaft and having, as a first engagement part, a fixed post extending
10 therefrom;

the second drive element includes a second drive plate on a second shaft portion mechanically linked to the output member and having, as a second engagement part, at least one cam element coupled to an energy storage member.

6. The motor operator of claim 5 where:

the operating member is arranged to hit a positive mechanical stop, after
15 motor operation has resulted in sufficient force transfer to the output member, that also stops movement of the second drive plate and the first drive plate proceeds with the post thereon passing and disengaging from the second engagement part on the second drive plate.

20 7. The motor operator of claim 6 where:

the first and second shaft portions are coaxial;

the first drive plate is chain driven off of the motor shaft and runs freely in relation to the first shaft portion; and

the second drive plate is fixed to the second shaft portion.

25 8. The motor operator of claim 3 where:

the operating member and a stationary part of the motor operator are arranged to be manually lockable together to allow power operation of the motor without movement of the output member.

30 9. An electrical power switch and a motor operator in combination, comprising:

a mechanical actuating linkage between the motor operator and the switch;

the motor operator having a motor with a motor shaft that is coupled to the mechanical actuating linkage through a drive assembly with a first drive element continuously mechanically linked to the motor shaft and a second drive element continuously mechanically linked to the mechanical actuating linkage of the operator and
5 the switch;

the first and second drive elements of the drive assembly including temporarily mutually engaging parts that, in operation, transfer sufficient torque for switch operation between open and closed positions followed by inherent decoupling of the first and second drive elements;

10 a manual operating member continuously linked with the mechanical actuating linkage and arranged to be accessible for manually operating the switch from ground level without turning the motor; and

the manual operating member and a stationary part of the motor operator being accessible for manually locking together to allow power operation of the motor
15 without movement of the mechanical actuating linkage.

10. The combination of claim 9 where:

the first and second drive elements include as the temporarily mutually engaging parts at least first and second engagement parts that are joined to respective ones of the first and second drive elements and at least one of the first and second
20 engagement parts includes an energy storage member;

the first and second drive elements have temporary mutual engagement with transfer of motive force that is released following switch operation to effect positive disengagement of the first and second drive elements;

the first drive element includes a first drive plate rotatable on a bearing
25 about a first shaft portion and mechanically linked to rotate in direct relation to rotation of the motor shaft and having, as a first engagement part, a fixed post extending therefrom;

the second drive element includes a second drive plate on a second shaft portion mechanically linked to the output member and having, as a second engagement
30 part, at least one cam element coupled to an energy storage member;

the operating member is arranged to hit a positive mechanical stop, after motor operation has resulted in sufficient force transfer to the output member, that also stops movement of the second drive plate and the first drive plate proceeds with the post thereon passing and disengaging from the second engagement part on the second drive plate.

11. An overhead electrical power switch and a motor operator in a combination installed together at an elevated location and comprising:

a mechanical actuating linkage between the motor operator and one or more movable contacts of the switch at the elevated location;

the motor operator including a motor, an output member joined with the mechanical actuating linkage, a drive assembly between the motor and the output member, and an operating member that extends to an exteriorly accessible position of the motor operator;

the motor is one capable of being reversibly driven to operate the switch, through the drive assembly, the output member and the mechanical actuating linkage, from a closed position to an open position and from an open position to a closed position;

the output member and the operating member being in a fixed relation for movement together;

the drive assembly including, at least in part, means for transmitting switch operating force from the motor to the output member that results in a decoupled state of the motor and the output member following each switch operation, even absent any reversal of the motor and before any manual operation; and

the operating member comprises means for locating an operating force means independent of the motor of the motor operator to operate the switch through the output member without operation of the motor of the motor operator.

12. The combination of claim 11 where:

the means for transmitting switch operating force of the drive assembly includes, at least in part, a first drive plate arranged for rotation upon motor operation and a second drive plate joined for rotational motion with the output member and the operating member.

13. The combination of claim 12 where:

the means for transmitting switch operating force further includes, at least in part, temporarily mutually engaging parts on the first and second drive plates including camming elements with or without any one or more energy storage elements, springs,
5 hydraulic elements, resilient elements, and slider elements.

14. The combination of claim 13 where:

the temporarily mutually engaging parts include, at least in part, a fixed post on one of the first and second drive plates and a spring-loaded finger on the other of the drive plates.

10 15. The combination of claim 11 where:

the operating member and the output member are in a combination with the drive assembly that includes, at least in part, stop means for stopping motion of the output member upon completion of a switch operation while the motor continues to operate to reach the decoupled state of the motor and the output member.

15 16. The combination of claim 15 where:

the stop means includes, at least in part, fixed stop elements on a stationary part of the motor operator that the operating member hits against upon a switch operation.

17. The combination of claim 11 where:

20 the means for location of an operating force means on the operating member includes, at least in part, features for manual application of a tool that can extend from a lower level to the elevated location and the operating force means includes, at least in part, a worker manipulating the tool.

18. The combination of claim 11 where:

25 the motor operator further includes means for selectively preventing motion of the output member during operation of the motor.

19. The combination of claim 18 where:

the means for selectively preventing motion of the output member includes, at least in part, one or more features of the operating member and of a stationary
30 part of the motor operator into which a tool can be selectively inserted to prevent motion

of the operating member and, consequently, of the output member, to allow operation of the motor without switch operation.

20. The combination of claim 11 further comprising:

an electrical supply and control unit at a lower location electrically
5 interconnected with the motor operator and including, in part, elements indicating an open or closed condition of the switch in the decoupled state of the motor operator drive assembly; and

one or more manually alterable control switches for selectively setting the electrical supply of the unit in relation to the motor operator to a desired mode including
10 locally initiated power operation and remotely initiated power operation.

21. A motor operator operating an electric switch in a combination comprising:

a motor for motorized operation of the switch;
a handle for manual operation of the switch, the handle having a constant
15 direct connection with an operating mechanism of the switch;

the motor being coupled to the operating mechanism of the switch by a momentary spring coupling connection arranged to deliver sufficient torque from the motor for switch operation;

the spring coupling connection also being arranged to decouple the motor
20 from the switch operating mechanism following a completed switch operation when mechanical stops are reached in a fully open or a fully closed position of the switch, thereby allowing manual operation of the switch by the handle without turning the motor.

22. The combination of claim 21 where:

the mechanical stops at completion of a switch operation are one or more
25 elements of a fixed part of the total combination that are struck by one or more elements of any of the handle, the switch operating mechanism, and the direct connection therebetween.

23. The combination of claim 21 further comprising:

means for selectively temporarily securing in a fixed position the handle,
30 the switch operating mechanism, and the direct connection therebetween to allow motor operation without switch operation.